

An investigation of the forest avifauna in the North Pare Mountains, Tanzania

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Forest birds were surveyed in four forests in the North Pare Mountains, Tanzania, from July to August 1993 and in July 1994. The main aims of this study were to locate globally threatened species and East Coast Escarpment endemics; compile species lists for each forest; assess the threats to the avifauna and forests and provide a preliminary conservation plan.

The results of prime importance include the discovery of the near-threatened Abbott's Starling *Cinnyricinclus femoralis* and several new range and altitude records, all of which are discussed later. A total of 45 592 net-metre-hours was spent surveying ten sites in the four forests: 559 individual birds comprising 30 species were ringed. A species list is included and behavioural notes on several species provided. In conclusion, a preliminary conservation plan and recommendations for further research are discussed.

Background

There is a limited amount of information available on the avifauna of the North Pares, in particular the forest species (Stuart *et al.* 1993), compared to, for example, those of Mt Kilimanjaro (reviewed in Cordeiro 1994) or the Usambaras (reviewed in Evans & Anderson 1992). Knowledge on the distribution of forest birds in this mountain range is mainly based on the brief visits by collectors employed by R. E. Moreau, by N. R. Fuggles-Couchman and T. Anderson. Moreau's collectors obtained birds from the North Pares in the 1930s (Moreau & Moreau 1937, Moreau 1940), followed by Fuggles-Couchman in June 1942 and October 1952 (Fuggles-Couchman 1984) and, finally Anderson between about 1957 and 1960 (Britton 1978, 1981).

Although specimen labels have not been examined, it seems that most of their collecting took place in the foothills except for known excursions to Kindoroko Forest Reserve, at the southern end of the range. In August 1984, K. M. Howell and C. A. Msuya made brief visits to Kilambeni forest and Minja Forest Reserve (FR) where they recorded several birds (Howell *in litt.*: see Table 3 and Appendix 1). More recently, between 21–24 October 1992, J. Fjelds  and J. Rab l ringed and observed birds mainly in the lower parts of Kindoroko Forest Reserve (Fjelds  *in litt.*, Fjelds  & Rab l *in press*). Other forests, such as the two patches at Kamwala, Mramba FR and Kiverenge FR did not appear to have been ornithologically surveyed and, including the under-studied Kindoroko and Minja FRs, therefore qualified as sites that needed to be investigated (Fig. 1). Kilambeni Forest and Kiverenge FR are the only sites that were not visited by us.

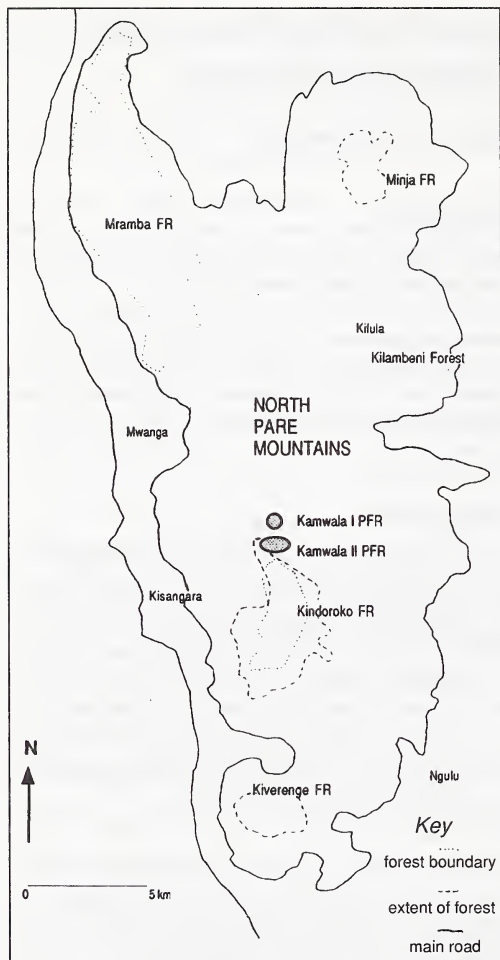


Figure 1. Forest reserves and proposed forest reserves in the North Pare Mountains, Tanzania

Study areas

The North Pare Mountains are situated in Mwanga District, Kilimanjaro Region. At present, several forest patches of varying sizes exist mainly at higher altitudes where they are relatively inaccessible due to the steep terrain. It is believed that forest cover was much more extensive in the past and has probably been severely altered over the last 2000 yr by the activities of agricultural societies (Schmidt 1989).

Apart from many small and scattered pockets of forest, including a large but degraded forest at Kilambeni (Howell *in litt.*), there are four forest reserves and two proposed forest reserves (PFR) in the North Pares (Figs. 1 and 2). Minja FR is in the north with an area of 520 ha and extends from 1500–1800 m. [N.B. Minja FR is wrongly denoted in the floodplains north of the North Pares in the recent topographic map (United Republic of Tanzania 1989).] Mramba FR, although the largest at 3355 ha, only has a small patch of forest within the reserve from about 1500–1700 m (Figs. 1 and 2).

Kamwala II PFR is 293 ha and Kindoroko FR comprises an area of 885 ha and ranges from about 1400–2100 m. Two additional sites remain unvisited: Kamwala I PFR (117 ha) is north of Kamwala II PFR and in the southern extreme of the North Pares lies Kiverenge FR (area not obtained) (Figs. 1 and 2).

All sites are surrounded by cultivation, dry scrubby vegetation or an *Euphorbia-Acacia* tree-bush-grassland mosaic in the lowlands. Dense clusters of villages dominate the south of Minja FR and encircle much of Kindoroko FR and Kamwala I and II PFRs. In contrast, Mramba FR and Kiverenge FR are bordered by fewer

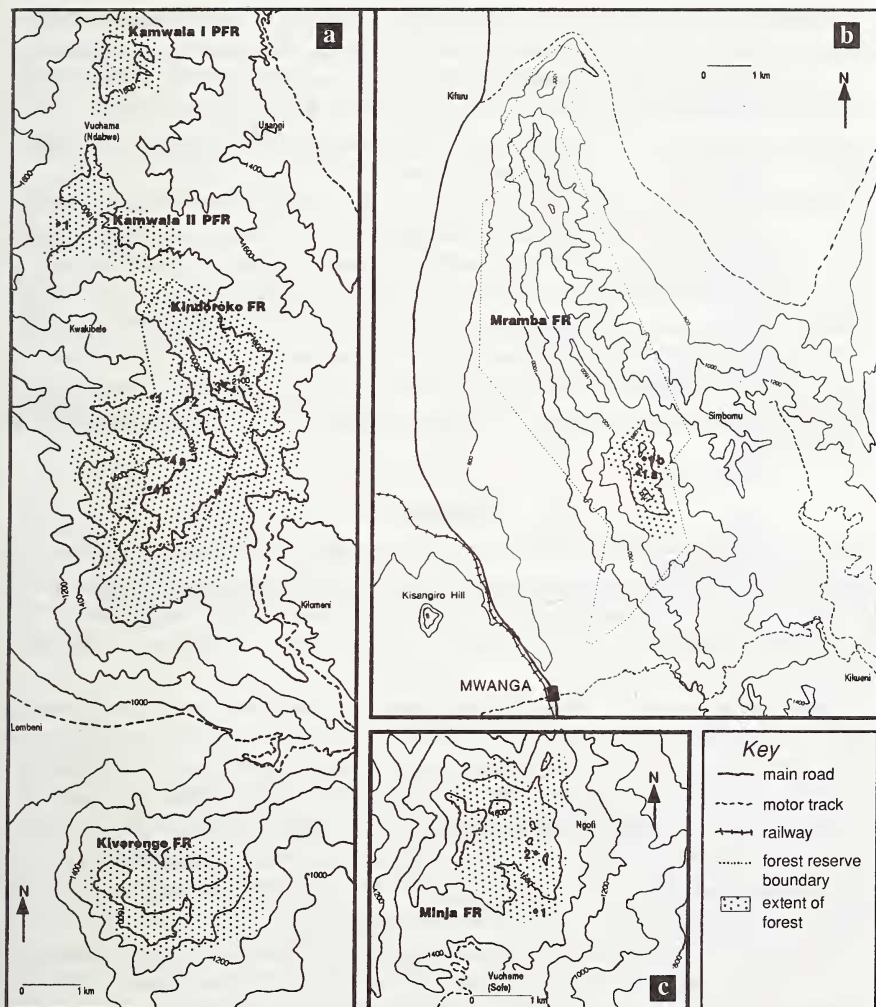


Figure 2. Location of forest reserves and proposed forest reserves in the North Pares (after United Republic of Tanzania 1989, Sandy 1990). All ringing sites (also see Table 1) are indicated on this map; a: Kindoroko FR and Kamwala II PFR; b: Mramba FR; c: Minja FR. Forest cover for Kamwala I and II PFRs, as denoted on this map, is not accurate but is indicated to show their proposed boundaries

villages. Many villages in this region have preserved small groves of forests (*jadi*) which are traditionally sacred and are the grave sites of the ancestors. These forests were not allowed to be cut down in the past but this has since changed: some degree of pole wood cutting and firewood collecting by those who do not fear to enter these sacred groves is now quite a common sight.

The vegetation at all four sites was mainly submontane forest except at higher altitudes in both Minja and Kindoroko FRs which were wetter and more montane in character; Mramba FR is a rather dry forest. At lower altitudes on all four sites, *Newtonia buchananii* and *Ficus* and *Albizia* trees predominated, with a dense rubiaceous understorey. In some areas, *Piper capense* also dominated the undergrowth. *Dracaena* sp. was abundant above 1750 m, particularly in Minja and Kindoroko FRs. Epiphytes, lichens and mosses were common above 1750 m at all four sites, but especially so at Minja and Kindoroko FRs. In general, the canopy height below 1900 m ranged from 20–30 m with occasional emergents (35–40 m) and at higher altitudes the canopy ranged from 10–20 m. In addition, there were several pockets of *Philippia excelsa* growing at varying altitudes on Kindoroko FR, Kamwala II PFR and Minja FR. It must be noted that *Podocarpus* sp grew in stunted form in small pockets on Kindoroko FR whereas it was a dominant species in a peculiar dry forest type that occurred below the *Newtonia–Albizia–Ficus* forest (east scarp) at Mramba FR.

Methods

The main objective of this survey was to locate Red Data Book bird species. In addition, species lists were to be compiled for each forest and notes taken on the threats to these sites. The information obtained would provide some indication of the conservation importance of each forest as well as enable comparisons with other Eastern Arc forests.

Three forest reserves (Kindoroko, Minja and Mramba) were investigated from 8 July to 18 August 1993. Kamwala II PFR was surveyed from 28–30 July 1994 (see Table 1). Both authors surveyed all sites except Kindoroko FR which was visited by NJC only. Birds were recorded at various altitudes (using a YCM altimeter) and habitats in these forests through audio-visual observations and mist-netting. These methods were used in combination to record as many species as possible: audio-visual observations provided sufficient coverage of different habitats whereas mist-netting efforts enabled the capture of elusive understorey species.

Between 15 to 19 mist nets were used to capture birds in all four forests. These nets were six to 24 m long and 2.5 to 3 m high. Nets were operated from dawn to dusk and, depending on capture rates, checked at half-hour to hour intervals. All birds were ringed and measured: the original data sheets are deposited with the Tanzania Bird Atlas Project. The following information on each site in the four forests is summarized in Table 1: amount of time spent mist-netting at each site; altitude of each site; duration of the avifaunal survey. Audio-visual observations were conducted when we alternated between netting and bird-watching every two to four hours.

Nomenclature and systematics in the text and tables follows Britton (1980) and Turner *et al.* (1991).

Table 1. *Duration of visits, survey efforts and altitudes of sites at all four forests*

Forest Reserve	Duration of visit	Site	Altitude (m)	Amount of time mist-netting (net-metre-hours)
Kindoroko	8–22 July 1993	1	1600	5590
		2	1800	3445
		3	2100	5265
		4a	1700	3835
		4b	1750	1150.5
				<i>subtotal</i> 19285.5
Minja	26 July–2 August 1993	1	1500	8405
		2	1700	5649.5
				<i>subtotal</i> 14054.5
Mramba	2–6 August 1993	1a	1700	5739
		1b	1650	2010
				<i>subtotal</i> 7749
Kamwala II	28–30 July 1994	1	1700	4503
				<i>subtotal</i> 4503
				<i>Total</i> 45592

Results

Species list

A total of 119 species, including three of uncertain identity, were recorded during our surveys. All bird species that were recorded in the North Pares are presented in Table 2 with information on the habitat in which each species was encountered and their respective altitude ranges. It is clear from this list that forest birds were the primary focus and non-forest species included herein were noted opportunistically whilst moving through other habitats in order to reach the forest sites. Table 2 is by no means a complete check-list for the North Pare forest avifauna as some species may have escaped detection due to the short study period, elusive behaviour or possible seasonal migration to lower altitudes at this time of year—the cold season. Proof of this are the four species recorded at Kindoroko and Minja FRs by other observers and not us (see Table 2). A further 47 species recorded by other observers from the “North Pares” are presented in Table 3; most of these are non-forest dwellers. In addition, Appendix 1 includes a list of 24 species (four uncertain) recorded in Kilambeni Forest (see Fig. 1) by K. M. Howell and C. A. Msuya in 1984.

Table 2. Systematic list of all species recorded in the North Pares during this study, with four exceptions. Information is provided on forest sites (K = Kamwala II PFR; Ki = Kindoroko FR; M = Minja FR; Mr = Mramba FR), habitats (f = forest; fe = forest edge; fg = forest glade; nf = non-forest habitats which includes scrub, cultivation and woodland) and altitude range. The altitudes are based on observations during this study only and therefore reflect the areas that were visited and not the North Pares as a whole. Square brackets indicate that species identification was not certain. Three species not recorded by us in Minja FR but observed there by K.M. Howell and C.A. Msuya (Howell in litt.) on 23 August 1984 are denoted by an asterisk (*). One species not recorded by us but noted at Kindoroko FR in October 1992 by J. Fjelds  and J. Rab l (Fjelds  in litt.) is denoted with a dot (•)

Family/species	Ki	M	Mr	K	Altitude range (m)
SCOPIDAE					
Hamerkop <i>Scopus umbretta</i>		nf			below 1400
ACCIPITRIDAE					
Palm-nut Vulture <i>Gypohierax angolensis</i>		nf			1500
African Goshawk <i>Accipiter tachiro</i>	f	f	f	f	900–1200
Augur Buzzard <i>Buteo augur</i>	nf	nf	nf	nf	below 2100
Crowned Eagle <i>Stephanoaetus coronatus</i>	f	f	f	f	1500–2100
Little Sparrowhawk <i>Accipiter minullus</i>		nf			1600
Mountain Buzzard <i>Buteo oreophilus</i>	f		f	f	1500–2100
Verreaux's Eagle <i>Aquila verreauxii</i>	nf				2100
Wahlberg's Eagle <i>A. wahlbergi</i>	nf				2100
Pale Chanting Goshawk <i>Melierax poliopterus</i>	nf				below 2100
African Harrier Hawk <i>Polyboroides typus</i>	f	nf			below 1700
African Hawk Eagle <i>Hieraaetus spilogaster</i>			f		below 1700
COLUMBIDAE					
African Green Pigeon <i>Treron calva</i>	fe	fe	fe	fe	below 1600
Lemon Dove <i>Aplopelia larvata</i>	f	f	f	f	1500–1900
Olive Pigeon <i>Columba arquatrix</i>	f	f	nf		(1200) 1500–1800
Emerald-spotted Wood Dove <i>Turtur chalcospilos</i>		nf			below 1300
Tambourine Dove <i>T. tympanistris</i>	f	f	f, nf	f	1400–1800
Red-eyed Dove <i>Streptopelia semitorquata</i>	nf	nf	nf	nf	below 1500
Ring-necked Dove <i>S. capicola</i>			nf		below 1300
MUSOPHAGIDAE					
Hartlaub's Turaco <i>Tauraco hartlaubi</i>	f	f	f	f	1400–2100
CUCULIDAE					
Yellowbill <i>Ceuthmochares aereus</i>			nf		1600
White-browed Coucal <i>Centropus superciliosus</i>			fg, nf		below 1700
STRIGIDAE					
African Wood Owl <i>Strix woodfordii</i>	f	f	f	f	1500–2100
APODIDAE					
Little Swift <i>Apus affinis</i>			nf		below 2100
[Black Swift <i>A. barbatus</i>]	nf				1700–2100
Horus Swift <i>A. horus</i>	nf		nf		1700
[Scarce Swift <i>Schoutedenapus myoptilus</i>]	nf				2100
Palm Swift <i>Cypsiurus parvus</i>			nf		below 1400
COLIIDAE					
Speckled Mousebird <i>Colius striatus</i>			nf		below 1500

Family/species	Ki	M	Mr	K	Altitude range (m)
Blue-naped Mousebird <i>Urocolius macrourus</i>		nf	nf		below 1500
TROGONIDAE					
Bar-tailed Trogon <i>Apaloderma vittatum</i>	f	f	f		1700–1800
ALCEDINIDAE					
Brown-hooded Kingfisher <i>Halcyon albiventris</i>	nf		nf		below 1500
Striped Kingfisher <i>H. chelicuti</i>			nf		below 1500
MEROPIDAE					
Cinnamon-chested Bee-eater <i>Merops oreobates</i>	f, fe	f, fe	f, fe	f, fe	1400–1900
BUCEROTIDAE					
Silvery-cheeked Hornbill <i>Bycanistes brevis</i>	f	f	f	f	1400–2100
Trumpeter Hornbill <i>B. bucinator</i>	f, fe	f, fe	f, fe	f, fe	1200–1600
Crowned Hornbill <i>Tockus alboterminatus</i>	fe, nf	fe, nf	nf		below 1500
Grey Hornbill <i>T. nasutus</i>			nf		below 1400
LYBIIDAE					
White-eared Barbet <i>Stactolaema leucotis</i>	fe	fe	fe, fg	fe, fg	1400–1750
Spotted-flanked Barbet <i>Lybius lacrymosus</i>	nf	nf	nf	nf	below 1500
Brown-breasted Barbet <i>L. melanopterus</i>			nf		below 1300
Moustached Green Tinkerbird <i>Pogoniulus leucomystax</i>	f	f	f	f	1450–2100
Red-fronted Tinkerbird <i>P. pusillus</i>			nf		below 1300
Red and Yellow Barbet <i>Trachyphonus erythrocephalus</i>			nf		below 1300
INDICATORIDAE					
Lesser Honeyguide <i>Indicator minor</i>			nf	f	1600–1750
Scaly-throated Honeyguide <i>I. variegatus</i>		f			1700
Eastern Honeybird <i>Prodotiscus zambesiae</i>	nf, fe				1450–1600
PICIDAE					
Golden-tailed Woodpecker <i>Campethera abingoni</i>				f	1750
Olive Woodpecker <i>Dendropicos griseocephalus</i>	f		f	f	1500–1800
HIRUNDINIDAE					
Black Rough-wing <i>Psalidoprocne pristoptera</i>	f	f	f	f	1200–2100
Mosque Swallow <i>Hirundo senegalensis</i>	nf	nf	nf		below 2100
African Rock Martin <i>H. fuligula</i>	nf				below 1400
Striped Swallow <i>H. abyssinica</i>			nf		below 1400
DICRURIDAE					
Drongo <i>Dicrurus adsimilis</i>			nf	nf	below 1300
CORVIDAE					
White-necked Raven <i>Corvus albicollis</i>	nf	nf	nf	nf	1500–2100
PARIDAE					
White-breasted Tit <i>Parus albiventris</i>	nf	*	nf		below 1500
TIMALIIDAE					
African Hill Babbler <i>Alcippe abyssinica</i>	f	f	f	f	1500–2100
PYCNOTIDAE					
Olive Mountain Greenbul <i>Phyllastrephus placidus</i>	f	f	f	f	1500–2100
Stripe-cheeked Greenbul <i>Andropadus milanjensis</i>	f	f	f	f	1500–2100
Zanzibar Sombre Greenbul <i>A. importunus</i>			fe	fe	1600–1750
Yellow-bellied Greenbul <i>Chlorocichla flaviventris</i>		nf			below 1500
Common Bulbul <i>Pycnonotus barbatus</i>	nf	nf	nf	nf	below 1500
TURDIDAE					
Northern Olive Thrush <i>Turdus abyssinicus</i>	f	f	f	f	1500–2100
Orange Ground Thrush <i>T. gurneyi</i>	f	f	f		1500–2100
Spotted Morning Thrush <i>Cichladusa guttata</i>			nf		below 1200
Robin Chat <i>Cossypha caffra</i>	fe	*		fe	1500–1750
Rüppell's Robin Chat <i>C. semirufa</i>	f	f	f	f	1500–2100
White-starred Forest Robin <i>Pogonocichla stellata</i>	f	f	f	f	1500–2100

Family/species	Ki	M	Mr	K	Altitude range (m)
Stonechat <i>Saxicola torquata</i>	nf	nf	nf	nf	1400–1800
SYLVIIDAE					
Black-headed Alapis <i>Alapis melanocephala</i>	f	f	f	f	1500–2000
Brown Woodland Warbler <i>Phylloscopus umbrovirens</i>	f				above 1900
Evergreen Forest Warbler <i>Bradypterus barratti</i>	f	f	f	f	1500–2100
Grey-backed Camaroptera <i>Camaroptera brachyura</i>	nf, fe	fe	fe, fg	fe	below 1750
Tawny-flanked Prinia <i>Prinia subflava</i>	nf		nf		below 1450
MUSCICAPIDAE					
Crested Flycatcher <i>Trochocercus cyanomelas</i>	f	f	f		1500–1750
Dusky Flycatcher <i>Muscicapa adusta</i>	fe	fe, fg	fg	fe, fg	1400–1750
Forest Batis <i>Batis mixta</i>	f		f?		1500–1600
Black-throated Wattle-eye <i>Platysteira peltata</i>		f		f	1500–1750
Paradise Flycatcher <i>Terpsiphone viridis</i>	nf	nf		f	below 1750
Grey Flycatcher <i>Bradornis microrhynchus</i>			nf		below 1300
Pale Flycatcher <i>B. pallidus</i>			nf (Kikueni)		below 1300
White-eyed Slaty Flycatcher <i>Melaenornis chocolatina</i>	fe	fe	fe		1400–1750
MOTACILLIDAE					
African Pied Wagtail <i>Motacilla aguimp</i>	nf	nf	nf	nf	below 1500
Mountain Wagtail <i>M. clara</i>				nf	1400
Striped Pipit <i>Anthus lineiventris</i>	nf			nf	1500–1700
MALACONOTIDAE					
Black-backed Puffback <i>Dryoscopus cubla</i>	f	f	f	f	1400–1750
Tropical Boubou <i>Laniarius ferrugineus</i>	fe	*	fg, fe		1500–1750
Many-coloured Bush Shrike <i>Malaconotus multicolor</i>	f	f	f	f	1500–2000
Four-coloured Bush Shrike <i>M. quadricolor</i>		fe	fe		1100–1800
Brown-headed Tchagra <i>Tchagra australis</i>			nf		below 1500
Black-headed Tchagra <i>T. senegala</i>	nf				below 1600
LANIIDAE					
Fiscal <i>Lanius collaris</i>	nf	nf	nf		below 1400
PRIONOPIDAE					
Helmet Shrike <i>Prionops plumata</i>			nf		below 1300
STURNIDAE					
Abbott's Starling <i>Cinnyricinclus femoralis</i>	fe, f				1600
Violet-backed Starling <i>C. leucogaster</i>	nf		nf		below 1300
Sharpe's Starling <i>C. sharpii</i>	fe, f				1600
Red-winged Starling <i>Onychognathus morio</i>	nf	nf	nf		below 1500
Waller's Chestnut-winged Starling <i>O. walleri</i>				f	1700
Kenrick's Starling <i>Poeoptera kenricki</i>	•	f	f		1500–1700
NECTARINIIDAE					
Collared Sunbird <i>Anthreptes collaris</i>	fe	fe	fe	fe	below 1500
Eastern Double-collared Sunbird <i>Nectarinia mediocris</i>	f	f	f	f	1500–2100
Olive Sunbird <i>N. olivacea</i>	f	f	f	f	1500–2100
Amethyst Sunbird <i>N. amethystina</i>	nf	nf	nf	nf	below 1500
Variable Sunbird <i>N. venusta</i>		nf	nf		below 1400
ZOSTEROPIDAE					
Montane White-eye <i>Zosterops poliogastra</i>	f	f	f	f	1500–2100
Yellow White-eye <i>Z. senegalensis</i>	nf		nf		below 1500
PLOCEIDAE					
Baglafaecht Weaver <i>Ploceus baglafaecht</i>	nf	nf	nf	nf	below 1750
Spectacled Weaver <i>P. ocularis</i>			nf		below 1700
[African Firefinch Indigobird <i>Hypochera funerea</i>]	nf		nf		below 1400
ESTRIDIDAE					
Red-faced Crimson-wing <i>Cryptospiza reichenovii</i>	f	f	f	f	1500–1900

Family/species	Ki	M	Mr	K	Altitude range (m)
Peters' Twinspot <i>Hypargos niveoguttatus</i>	fe			fe	1700
Red-billed Firefinch <i>Lagonosticta senegala</i>	nf		nf		below 1600
Green-backed Twinspot <i>Mandingoa nitidula</i>		f, fe		f	1500–1750
Yellow-bellied Waxbill <i>Estrilda melanotis</i>	fe			fe	1400–1600
Waxbill <i>E. astrild</i>	nf	nf	nf		below 1600
Red-cheeked Cordon-bleu <i>Uraeginthus bengalus</i>				nf	below 1400
Black and White Mannikin <i>Lonchura bicolor</i>	fe	fe	fe, fgfe, fg		below 1750
FRINGILLIDAE					
Thick-billed Seed-eater <i>Serinus burtoni</i>				f	1750
African Citril <i>Serinus citrinelloides</i>	nf	nf	nf	nf	1400–1800

Table 3. List of additional bird species noted from the North Pare area by other observers. Note that three species that were not recorded by us at Kindoroko FR are denoted with an asterisk (*). Unless stated otherwise, most locations are indicated in Figures 1 and 2

Species	Location, altitude, date and source
Ovampo Sparrowhawk <i>Accipiter ovampensis</i>	Lembeni, Aug 1959 (Anderson in Britton 1981)
Lizard Buzzard <i>Kaupifalco monogrammicus</i>	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya in litt.)
Gabar Goshawk <i>Micronisus gabar</i> *	Kindoroko FR, October 1992 (J. Fjelds� in litt.)
Pygmy Falcon <i>Polihierax semitorquatus</i>	Ngulu (Fuggles-Couchman 1984)
Shelley's Francolin <i>Francolinus shelleyi</i>	May 1958 (Anderson in Britton 1978)
Lesser Moorhen <i>Gallinula angulata</i>	seasonal pool, Lembeni (Fuggles-Couchman 1984)
Little Ringed Plover <i>Charadrius dubius</i>	Nov 1957 (Anderson in Britton 1978)
Two-banded Courser <i>Rhinoptilus africanus</i>	Kileo (3�29N, 37�37E), June 1942 (Fuggles-Couchman 1984)
Emerald Cuckoo <i>Chrysococcyx cupreus</i>	Lembeni, April 1960; Kisangara March 1959 (Fuggles-Couchman 1984)
Levaillant's Cuckoo <i>Oxylophus levaillantii</i>	Jan/Feb (Anderson in Britton 1981)
Eurasian Scops Owl <i>Otus scops</i>	ssp. <i>scops</i> , 2000 m, Nov 1958 (Britton 1980)
Eurasian Swift <i>Apus apus</i>	Jan 1960, 800 m ((Anderson in Britton 1981)
Alpine Swift <i>A. melba</i>	Kisangara, 500 m, Oct 1952 (Fuggles-Couchman 1984)
Narina's Trogon <i>Apaloderma narina</i>	1800–2000 m (Anderson in Britton 1981)
Chestnut-bellied Kingfisher <i>Halcyon leucocephala</i>	"Pare Mts" (Britton 1980)
Pygmy Kingfisher <i>Ispidina picta</i>	900–1400 m (Anderson in Britton 1981)
Green Wood Hoopoe <i>Phoeniculus purpureus</i>	dry east slope, below Kifula, Aug 1984 (K. M. Howell and C. A. Msuya in litt.)
Abyssinian Scimitarbill <i>Rhinopomastus minor</i>	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya in litt.)
Ground Hornbill <i>Bucorvus cafer</i>	near Kikueni, Aug 1984 (K. M. Howell and C. A. Msuya in litt.)
Pallid Honeyguide <i>Indicator meliphilus</i>	(Britton 1980)

Species	Location, altitude, date and source
Wahlberg's Honeybird <i>Prodotiscus regulus</i>	west slope, 1500 m, June 1961 (Anderson <i>in</i> Britton 1981)
Bennett's Woodpecker <i>Campethera bennettii</i>	woodland (Britton 1980)
African Pitta <i>Pitta angolensis</i>	Lembeni, April 1960 (Anderson <i>in</i> Britton 1978)
Fawn-coloured Lark <i>Mirafra africanoides</i>	foothills (Britton 1980)
Red-rumped Swallow <i>Hirundo daurica</i>	highland areas (Britton 1980)
Black-headed Oriole <i>Oriolus larvatus</i>	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya <i>in litt.</i>)
Mouse-coloured Penduline Tit <i>Remiz musculus</i>	foothills up to 900 m (Britton 1980)
Scaly Chatterer <i>Turdoides aylmeri</i>	foothills (Britton 1980)
Black Cuckoo Shrike <i>Campephaga flava</i>	Kifula, Aug 1984 (K. M. Howell and C. A. Msuya <i>in litt.</i>)
Nicator <i>Nicator chloris</i>	1700 m (Anderson <i>in</i> Britton 1981)
White-chested Alethe <i>Alethe fuelleborni</i> *	Kindoroko FR, December 1991 (N. E. and E. M. Baker, pers. comm.)
Eastern Bearded Scrub Robin <i>Cercotrichas quadrivirgata</i>	up to 1800 m (Britton 1980)
Cinnamon Bracken Warbler <i>Bradypterus cinnamomeus</i> *	Kindoroko FR, October 1992 (J. Fjeldså <i>in litt.</i>)
Ashy Cisticola <i>Cisticola cinereola</i>	northern foothills (Fuggles-Couchman 1984)
Tiny Cisticola <i>C. nana</i>	foothills (Britton 1980)
Long-billed Pipit <i>Anthus similis</i>	(Britton 1980)
Pangani Longclaw <i>Macronyx aurantiigula</i>	Ngulu (Fuggles-Couchman 1984)
Grey Wagtail <i>Motacilla cinerea</i>	winter visitor (Britton 1980)
Chestnut-fronted Helmet Shrike <i>Prionops scopifrons</i>	dry east slope, near Ubembe, Aug 1984 (K. M. Howell and C. A. Msuya <i>in litt.</i>)
Magpie Starling <i>Speculipastor bicolor</i>	west side at 900 m, Jan 1957 (Anderson <i>in</i> Britton 1981)
Little Purple-banded Sunbird <i>Nectarinia bifasciata</i>	Britton (1980)
Hunter's Sunbird <i>N. hunteri</i>	dry east slope, between Kifula and Ubembe, Aug 1984 (K. M. Howell and C. A. Msuya <i>in litt.</i>)
Scarlet-tufted Malachite Sunbird <i>N. johnstoni</i>	probable wanderer at north end, 1800 m (Moreau 1940)
Golden-winged Sunbird <i>N. reichenowi</i>	Britton (1980)
Grosbeak Weaver <i>Amblyospiza albifrons</i>	Kifula, Aug 1984 (K.M. Howell and C.A. Msuya <i>in litt.</i>)
Grey-headed Silver-bill <i>Lonchura griseicapilla</i>	(Anderson <i>in</i> Britton 1978)

Mist-netting

We spent a total of 45 592 net-metre-hours surveying ten sites in the four North Pare forests (Table 4; Fig. 2). We ringed 559 individuals comprising 30 species (Table 4). The most abundant species netted at all four sites were Olive Mountain Greenbul, Olive Sunbird and White-starred Forest Robin. The Stripe-cheeked Greenbul and Red-faced Crimsonwing were also commonly trapped (see Table 4).

Table 4. List of birds netted and ringed in four North Pare forests (scientific names are given in Table 2)

Species	Mramba	Kindoroko				Minja		Kamwala
	1	1	2	3	4	1	2	1
African Goshawk		1		1			1	
Lemon Dove	1	1						
Tambourine Dove	1							
African Wood Owl			1					
Moustached Green Tinkerbird	1							
Olive Woodpecker								1
African Hill Babbler		2		1		3		1
Olive Mountain Greenbul	23	16	8	8	13	15	9	17
Stripe-cheeked Greenbul	5	10		1	3	17	4	13
Zanzibar Sombre Greenbul	1							1
Northern Olive Thrush		1	3	1	2	5	2	3
Orange Ground Thrush	1	1		2	(1)*	4	3	
Robin Chat				1				
Rüppell's Robin Chat	12	2		1	4	3	2	4
White-starred Forest Robin	11	7	3	3	10	30	13	3
Brown Woodland Warbler				3				
Evergreen Forest Warbler	2			3		1	1	1
Grey-backed Camaroptera	1							
Crested Flycatcher	3	1				9	1	
Dusky Flycatcher								1
Black-throated Wattle-eye						3		1
Paradise Flycatcher								2
Tropical Boubou	1							
Many-coloured Bush Shrike		1						
Collared Sunbird						2		2
Eastern Double-collared Sunbird		1	1	2				1
Olive Sunbird	1	35	8	1	14	40	11	24
Montane White-eye		2		2		7		
Red-faced Crimsonwing	9	7	2		2	17	2	4
Green-backed Twinspot						7		2
Total	74	88	27	29	49(50)	163	49	81

Note: * = killed by African Wood Owl in net

Breeding records

During our survey of the four forests, we opportunistically recorded the breeding activities of 23 bird species for which we have a total of 91 records, two of which were suspected breeding records. Observations were made of active nests containing fledglings or eggs, dependent juveniles being fed by a parent, birds collecting nesting materials and birds with fresh brood patches. The last indicator is reliable (e.g., Tye 1992) and we have avoided including misleading information by selecting only those individuals which showed fresh brood patches (score 4 or 5). Table 5 presents this information by site, habitat, altitude range of records and month of breeding activity.

Table 5. *Breeding records of 23 species in the North Pare Mountains. Breeding records (b = fresh brood patch of scores 4 and 5; d = dependent juvenile; n = active nest with young or eggs; s = suspected breeding based on nest-building activities), sites (K = Kamwala II PFR; Ki = Kindoroko FR; M = Minja FR; Mr = Mramba FR), habitat (f = forest; fe = forest edge), altitude of observation and month of activity are given*

Species	Breeding records	Site/habitat	Altitude (m) and number of records (in parentheses)	Month
African Goshawk	n	Ki/f	1600 (1)	Jul
Augur Buzzard	n	Ki/fe	1600 (1)	Jul
Hartlaub's Turaco	s	Ki/fe	1600 (1)	Jul
Moustached Green Tinkerbird	b	Mr/f	1650 (1)	Aug
African Hill Babbler	b	M/f	1500 (1)	Jul
Olive Mountain Greenbul	b	K, Ki, M, Mr/f	1500 (3), 1700 (14), 1800 (2)	Jul, Aug
Stripe-cheeked Greenbul	b, d	K, M, Mr/f	1500 (1), 1700 (5)	Jul, Aug
Northern Olive Thrush	b	M/f	1500 (1)	Jul
Orange Ground Thrush	b	Ki, M/f	1500 (2), 1700 (1), 2100 (1)	Jul
Rüppell's Robin Chat	b	Mr/f	1700 (4)	Aug
White-starred Forest Robin	b	Mr/f	1700 (1)	Aug
Crested Flycatcher	b	M, Mr/f	1500 (4), 1700 (3)	Jul, Aug
Dusky Flycatcher	f	Ki/fe	1600 (1)	Jul
Tropical Soubou	b	Mr/f	1700 (1)	Aug
Collared Sunbird	b	M/f	1500 (1)	Jul
Olive Sunbird	b	K, M/f	1500 (12), 1700 (7)	Jul
Montane White-eye	b	K, M/f	1500 (6), 1600 (1)	Jul
Red-faced Crimsonwing	b	K, Ki, M, Mr/f	1500 (2), 1600 (1), 1700 (5)	Jul
Green-backed Twinspot	b	M/f	1500 (3)	Jul
Waxbill	n	Ki/fe	1600 (1)	Jul
Black and White Mannikin	s	K/fe	1700 (1)	Jul
Thick-billed Seedeater	d	K/f	1700 (1)	Jul
African Citril	d	K/fe	1750 (1)	Jul

Notes on selected species

This section is divided into four parts which deal with Red Data Book birds, new range extensions, new altitude records and interesting behavioural notes regarding feeding and hunting.

Red Data Book species

Four species of "near-threatened" and "candidate threatened" status (Collar & Stuart 1985) which were recorded in the North Pares are discussed.

Abbott's Starling *Cinnyricinclus femoralis*—near-threatened

This species is only known from a few montane forests in Kenya and Tanzania. It was previously known to occur in the Kikuyu Escarpment and Mts Kenya, Kilimanjaro and Meru (Collar & Stuart 1985, Collar *et al.* 1994). It was discovered at Kindoroko FR in the North Pare Mountains during this study. Flocks of 20–25 adults and immatures

were seen in the evenings as they came to roost in the canopy (1600 m). They appeared to be followed by smaller flocks of Sharpe's Starlings and it is possible that some flocks were mixed. These species are considered to be allopatric (Britton 1980); however, recent evidence suggests that this may not be true at all sites (Britton 1980, Taylor & Taylor 1988, Cordeiro 1994). The presence of this species in the North Pares may be seasonal and further work during other months is required to establish its status there.

White-chested Alethe *Alethe fuelleborni*—candidate-threatened

Previously unknown from this mountain range, this species was heard at Kindoroko FR in December 1991 (N. E. and E. M. Baker, pers. comm.). Efforts to locate this understorey dweller in July 1993 proved fruitless and it is possible that it is scarce and very locally distributed in this reserve.

Kenrick's Starling *Poeoptera kenricki*—candidate-threatened

This species was not recorded by us at Kindoroko FR and Kamwala II PFR but may have been overlooked because of its wandering habits. This is further emphasized by observations of it at Kindoroko FR by J. Fjeldså and J. Rabøl (see Table 3). However, a few very small flocks (< 5 per flock) were seen at Minja FR and larger flocks (10–15) were regularly encountered at Mramba FR where they foraged on figs.

Chestnut-fronted Helmet Shrike *Prionops scopifrons*—candidate-threatened

Britton (1980) does not include the North Pares as a locality for this local species; however, K. M. Howell and C. A. Msuya noted ten individuals below the eastern scarp, between Kifula and Ubembe in August 1984 (K. M. Howell *in litt.*).

New range extensions and notes on little-known species in the North Pares

Several species were recorded that are not mentioned from the North Pares by Britton (1980). Many of these may have been overlooked because of their elusive behaviour or migratory habits. These are: Yellowbill, Horus Swift, [Scarce Swift], Zanzibar Sombre Greenbul, Forest Batis and Green-backed Twinspot. The omissions of two conspicuous species—Mountain Buzzard and Cinnamon-chested Bee-eater—from Britton (1980) is strange since they occur commonly at most forested sites in the North Pares. Dowsett & Dowsett-Lemaire (1979) and Turner (1980) also do not mention the North Pares as a location for the buzzard.

Another two species—Thick-billed Seedeater and Waller's Chestnut-winged Starling—were recorded in the North Pares (Moreau 1940, Britton 1981) but no mention was made of the exact locations. The seed-eater, which can be easily overlooked as it often haunts the canopy, was recorded at Kamwala II PFR; it may also occur at other sites. The starling, known from the South Pares as well (Fuggles-Couchman 1984), was collected by T. Anderson at 1600 m in the North Pares (Britton 1981): a pair was recorded at Kamwala II PFR and it may therefore be a scarce species in this range.

New altitude records

The Stripe-cheeked Greenbul and Four-coloured Bush Shrike were located above the altitudes given in Britton (1980). The greenbul was common up to 2100 m, an observation which corresponds with others made on Mt Kilimanjaro (Cordeiro 1994). The bush shrike, which mainly occurs below 600 m, is also known from 900 m and 1200 m at Ngulia and Endau, Kenya respectively (Britton 1980). T. Anderson collected it at 2000 m in the North Pares; the precise locality is unknown (Britton 1981). Although not recorded at Kindoroko FR, this species was noted from forest and dense thickets at Minja FR (1500–1800 m) and Mramba FR (1700 m). A male was also seen in short and dense dry scrub/thickets along the escarpment near Kikueni (1200 m).

Behavioural notes

African Goshawk *Accipiter tachiro*

This raptor was the first species to call in the early mornings at about 05:00–05:30. Three attacks on birds by this species were observed. The first occurred at about 07:30 on 31 July 1993 at Minja FR where an immature goshawk attacked a Stripe-cheeked Greenbul caught in a mist net. It missed due to the presence of NJC and was caught in the net. On 1 August the same individual had perched in the canopy about 50 m away from a mixed feeding flock. At 14:12 it swooped into the flock and captured one unidentified bird from the canopy. Another attack was observed on 3 August at Mramba FR: an adult had been watching a pair of Lemon Doves foraging on the ground near a net. When NJC approached and disturbed the doves, both flew into the net. Within one to two seconds, the raptor dived from the canopy and seized one dove, later releasing it as NJC ran to remove the netted doves.

African Harrier Hawk *Polyborides typus*

This bird was observed foraging in an old emergent *Newtonia buchananii* tree at 1700 m. Although typically a woodland species, it has been recorded inside forest in the Usambaras (Stuart 1989).

Olive Pigeon *Columba arquatrix*

A flock of about ten were observed feeding on fruits in dry woodland near the village of Simbomu. This is an unusual record as this pigeon is a forest species (Britton 1980) and the nearest forest in this case was at least 2 km away.

African Wood Owl *Strix woodfordii*

An Orange Ground Thrush was killed in the net by this owl between 17:00–17:30 on 17 July in Kindoroko FR. This behaviour was repeated at Kamwala II PFR on 29 July at about 17:30–18:00 where a Northern Olive Thrush was killed by the same species.

Orange Ground Thrush *Turdus gurneyi*

At 18:00 on 28 July 1993 at 1500 m in Minja FR, an Orange Ground Thrush was netted, ringed and released. This individual was later retrapped at 1700 m at 12:30 on 30 July. This capture is of interest as it represents an upward vertical shift of 200 m in

less than two days during the cold-season; an observation that we have not come across elsewhere in the literature.

White-eyed Slaty Flycatcher *Melaenornis chocolatinia*

Mackworth-Praed & Grant (1960) mention that this species takes berries on occasion. One observation was made at Kindoroko FR of this species feeding on the ripe dark purple berries of a rubiaceous shrub.

Discussion

Preliminary comparison with other Eastern Arc forests

Given the short study period and the incomplete knowledge of the forest avifauna in the North Pares, it is difficult to make a detailed comparison with other Eastern Arc forests here. In brief, some birds are common to the Usambaras and North Pares but absent from nearby Mt Kilimanjaro, e.g. Orange Ground Thrush and White-chested Alethe. Several species occurring on Kilimanjaro are also subspecifically distinct from those found in the North Pares and Usambaras, e.g. Tropical Boubou and White-starred Forest Robin. This shows that the North Pares share some affinity with the Eastern Arc biota; however, there are several species that the North Pares share in common with Kilimanjaro which are apparently absent from the Usambaras, e.g. Brown Woodland Warbler, Abbott's Starling and Thick-billed Seed-eater. In addition, compared to the Usambaras, turdines and greenbuls are poorly represented in the North Pares. It appears, therefore, that the forest avifauna of the North Pares is intermediate between that of the volcanic mountains such as Kilimanjaro and that of the Eastern Arc mountains; but, as Fjelds  & Rab l (in press) contend, there is also some degree of affinity with the avifauna of the coastal forest mosaic. Fjelds  & Rab l (in press) speculate that the ash-fall from Kibo's (Mt Kilimanjaro) last eruption at about 36 000 BP may have caused the extinctions of much of the Eastern Arc biota in the North Pares. Further work in the Pares and other little-explored areas in the region will add to our understanding of the birds of this range.

Conservation recommendations

The forest reserves in the North Pare Mountains, though small, are now known to harbour some globally important birds such as Abbott's Starling and some Eastern Arc endemics and near-endemics. These reserves did not appear to be under any immediate threat; nevertheless, there is some degree of pit-saw logging at all three forest reserves which may prove destructive if a large market for the timber develops in the near future. In addition, farmers are slowly encroaching into the southern section of Minja FR which could prove destructive.

These forests are important catchment areas for the North Pare plateau and surrounding foothills. With further degradation of the remaining forests in the North Pares, this region and the people who inhabit it are sure to face dire consequences similar to those that occurred at Mt Mulange, Malawi, in 1991 where heavy rainfall caused massive mudslides on the deforested slopes of the mountain that overcame several villages (*The Times*, 23 March 1991, *loc. cit.* Evans & Anderson 1992). In

addition, the important biota of these forests would be lost. It is for these reasons that we fully support the establishment of Kamwala I and II PFRs by the Kilimanjaro Catchment Forest Project, initiated by M. I. L. Katigula and currently managed by S. S. Kashenge. Both these forests are being encroached on by farmers and, if the present rate continues, the villagers will face local water shortages for their homes and *shambas*.

The following recommendations are suggested to promote the conservation of, and to enhance our understanding of the forests and their biota in the North Pares (see also a detailed review on forest conservation in Tanzania in Rodgers (1993)):

1. Urgent mapping of all the remaining forests, including the sacred groves (*jadi*), needs to be conducted.
2. All the boundaries need to be clearly marked with tree cordons. Although the boundaries of Minja and Kindoroko FRs were well-marked, those of Mramba FR remained to be completed.
3. Forest rangers should be given incentives for their often dangerous work. Only with these incentives and co-operative officials, will they be able to prevent any further destruction from taking place in the forests.
4. The villagers need to be educated about the importance of these forests and be actively involved with indigenous tree-planting activities in the area. These trees could form a buffer zone around some forest reserves or serve as protection against erosion on the farmed slopes. Some of these trees could be harvested for timber or firewood on a continuous basis.
5. Research must be conducted on the most nutritional fodder for livestock in this range. Kamwala II PFR seemed to be invaded by cattle to the extent that the understorey was quite disturbed. A suitable alternative that could replenish itself quickly on the plateau must be sought to cater for the needs of the farmers and livestock.
6. Long-term research on birds is required for all the forest reserves on this range. This includes the three sites visited as well as Kamwala I PFR and Kiverenge FR. The avifauna is still poorly known and long-term research may add more threatened species and East Coast Escarpment endemics or near-endemics. In addition, ringing studies should be conducted over a long period (up to three years) to determine whether or not certain species move between the forests. Many small forest groves (*jadi*) exist that possibly serve as important "stepping stones" for bird dispersal between larger forest reserves. These patches may also serve as important habitats for species of restricted range not known from the larger reserves and therefore require to be visited.
7. Other animal groups in this range have been little studied. A multi-disciplinary expedition focusing on the fauna and flora of the North Pares would provide useful information for conservation purposes. For example, the restricted Black and Rufous Elephant Shrew *Rhynchocyon petersi* was recorded during our surveys (NJC pers. obs.) providing a new locality record for this species.

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Appendix 1

Birds recorded at Kilambeni Forest—a degraded forest patch at c. 1550 m (see Fig. 1)—in August 1984 by K. M. Howell and C. A. Msuya (K. M. Howell *in litt.*)

Crowned Eagle *Stephanoaetus coronatus*
Hildebrandt's Francolin *Francolinus hildebrandti*—woodland/cultivation near forest
Olive Pigeon *Columba arquatrix*
Tambourine Dove *Turtur tympanistria*
Hartlaub's Turaco *Tauraco hartlaubi*
African Wood Owl *Strix woodfordii*
[Narina's Trogon *Apaloderma narina*
Silvery-cheeked Hornbill *Bycanistes brevis*
Trumpeter Hornbill *B. bucinator*
Crowned Hornbill *Tockus alboterminatus*
Tinkerbird species *Pogoniulus* sp.
[Moustached Green Tinkerbird *P. leucomystax*
African Hill Babbler *Alcippe abyssinica*
Olive Mountain Greenbul *Phyllastrephus placidus*
Common Bulbul *Pycnonotus barbatus*
White-starred Forest Robin *Pogonocichla stellata*
Dusky Flycatcher *Muscicapa adusta*
Black-throated Wattle-eye *Platysteira peltata*
Paradise Flycatcher *Terpsiphone viridis*
Black-backed Puffback *Dryoscopus cubla*
Tropical Boubou *Laniarius ferrugineus*
[Many-coloured Bush Shrike *Malaconotus multicolor*
White-eye *Zosterops* sp.
Peters' Twinspot *Hypargos niveoguttatus*